



October 6, 2014

Submitted via Electronic Mail

Ms. Jackie Drummond
Compliance Hydrogeologist
North Carolina Department of Environment and Natural Resources
Division of Waste Management - Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

**Re: Request for Alternate Frequency of Appendix II Assessment Monitoring
Charlotte Motor Speedway, Landfill V, Permit No. 13-04
Concord, North Carolina**

Dear Ms. Drummond:

On behalf of BFI Waste Systems of North America, Inc. - Charlotte Motor Speedway, Landfill V, Jett Environmental Consulting is submitting a request to modify the groundwater monitoring frequency for the Appendix II list of Assessment constituents. North Carolina Department of Environment & Natural Resources (NCDENR) Requirements for Municipal Solid Waste Landfill Facilities Section 15A NCAC 13B .1634(c) states the following:

The Division may specify an appropriate alternate frequency for repeated sampling and analysis for the full set of Appendix II constituents required by Rule .1634(b), during the active life and post-closure care of the unit considering the following factors:

- (1) Lithology of the aquifer and unsaturated zone;*
- (2) Hydraulic conductivity of the aquifer and unsaturated zone;*
- (3) Ground-water flow rates;*
- (4) Minimum distance of travel;*
- (5) Resource value of the aquifer; and*
- (6) Nature, fate, and transport of any detected constituents.*

The site initiated an Assessment Monitoring program due to confirmed volatile organic compound (VOC) detections that occurred during the October 2004 event. Sampling of the full set of Appendix II Assessment constituents has been conducted annually during the first semi-annual event of 2005 through 2014 (10 years). The Appendix II constituents that have been detected are also on the Appendix I Detection Monitoring list, with the exception of dichlorodifluoromethane, mercury, and tin. The current list of Assessment wells that incur annual Appendix II monitoring includes MW-17, MW-18A, MW-19, MW-19A, MW-20B, and MW-25 (see **Figure 1**).

In an effort to specify a more appropriate alternate frequency of repeated sampling and analysis for the full set of Appendix II constituents, the above 6 factors are discussed as follows:

(1) Lithology of the aquifer and unsaturated zone

Previous site investigations indicate that groundwater is first encountered in either the saprolite, Piedmont weathered rock, or bedrock depending on location. However, the groundwater surface occurs primarily in the saprolite and weathered rock. Data suggests hydraulic connection between these units, which form the uppermost aquifer. Data indicate that the groundwater flow is principally within the saprolite and Piedmont weathered rock, in the direction of the Rocky River. Locally, the vertical component of the groundwater flow

may be slightly downward in topographic high areas and slightly upward in topographic low areas. In general, the configuration of the groundwater surface is similar to the topography of the site.

(2) Hydraulic conductivity of the aquifer and unsaturated zone

Based on S&ME, Inc.'s "Groundwater Certification Document, CMS Landfill V (dated October 4, 1994)", hydraulic conductivities (k) are from the geometric mean of the hydraulic conductivity for each unit monitored at the site, and are as follows:

- For wells in Saprolite: 1×10^{-3} cm/sec;
- For wells in Partially Weathered Rock: 2×10^{-4} cm/sec; and
- For wells in Bedrock: 7×10^{-5} cm/sec.

(3) Groundwater Flow Rates

As reported in the "Groundwater Statistical Analysis Report, First Semi-Annual 2014 Sampling Event" compiled by Herst & Associates, Inc. (dated June 9, 2014), the groundwater flow rate for the First Semi-Annual 2014 event was estimated to range from 21 feet/year to 135 feet/year, consistent with past events.

(4) Minimum Distance of Travel

The wells in Assessment (MW-17, MW-18A, MW-19, MW-19A, MW-20B, and MW-25) are considered impacted by landfill gas. Based on the most recent potentiometric surface map (see **Figure 1**), the following approximate distances exist between the respective wells and the edge of the MSWLF unit:

- MW-17: 160 feet;
- MW-18A: 100 feet;
- MW-19/MW-19A: 27 feet;
- MW-20B: 138 feet; and
- MW-25: 198 feet.

(5) Resource Value of the Aquifer

The following information was presented in the Design Hydrogeologic Report (Phase 3) dated May 2009 by David Garrett and Associates. An area water well survey was completed during the "site suitability" stage of the permitting process. Since then, public utilities have been extended into the vicinity and area reliance on groundwater use has decreased. No groundwater users exist downgradient of the landfill, i.e., no residences or wells exist between the landfill and the groundwater discharge features. The site is hydraulically isolated from its surroundings by numerous groundwater divides, i.e., the Rocky River and creeks, which are localized groundwater discharge features of the uppermost aquifer. Municipal water is available throughout the vicinity. Therefore, the resource value of the uppermost aquifer within the permitted acreage of the site is considered minimal.

(6) Nature, Fate, and Transport of Any Detected Constituents

Low levels of VOCs originating from landfill gas apparently have impacted the groundwater. During the most recent event (First Semi-Annual 2014), all inorganic concentrations were statistically below the groundwater protection standards (GWPSs) and only one VOC (1,4-dichlorobenzene at MW-25) statistically exceeded a GWPS. Wells in the proximity of MW-25 (MW-2A, MW-2B, MW-22, and MW-22A) and wells downgradient of MW-25 (MW-10 and MW-10A) do not exhibit quantifiable (i.e. at or above the SWSL) detections of 1,4-dichlorobenzene. Therefore, 1,4-dichlorobenzene is limited to the vicinity of MW-25.

Since wells are located between MW-25 and the property line and those wells do not exhibit detections of 1,4-dichlorobenzene, wells downgradient of MW-25 already exist and the extent of 1,4-dichlorobenzene has been defined to the area in the vicinity of MW-25 (no indication of off-site migration).

Site Improvements since Initiation of Assessment Monitoring

The following is a brief summary of site improvements to the landfill gas collection and control system (GCCS). The GCCS has been operational at the Landfill since 1996. As areas of the Landfill reached 5 years old or 2 years old and at final grade, the GCCS was expanded in general accordance with the NSPS GCCS Design Plan. The GCCS was designed and constructed in general accordance with the NSPS provisions and the NSPS GCCS Design Plan.

Fortistar operates two plants (with three turbines totaling 6,500 scfm) as part of the landfill gas to energy (LFGTE) facility, with power being delivered to Duke Energy. Each year the facility installs additional vertical LFG extraction wells and replaces extraction wells, as needed. Additional LFG header pipe and lateral pipes have been installed to supplement the existing header and lateral pipes to provide vacuum to the extraction wells. In 2014, two horizontal collection trenches were installed to provide additional LFG to the GCCS and to diminish leachate seeps. Because of the improvements, the efficiency of the GCCS has improved each year. 2014 upgrades to the GCCS should further enhance the removal of landfill gas and continued improvement in groundwater quality.

Past Water Quality Assessment Activities

In a letter dated January 28, 2010 from NCDENR to the site, a Water Quality Assessment Plan (WQAP) was requested. Subsequently, the site submitted a WQAP on March 19, 2010 of the proposed activities to address the constituents detected above the North Carolina 15A NCAC 2L Water Quality Standards at the site. In correspondence dated April 8, 2010, NCDENR approved the WQAP. The proposed field activities associated with the WQAP were conducted in May 2010. A Water Quality Assessment Report summarizing the data collected during the Water Quality Assessment activities was submitted under separate cover on August 2, 2010.

The August 2, 2010 Water Quality Assessment Report provided a summary of actions completed to date and proposed actions in order to address the source and extent of the VOC detections in groundwater monitoring wells at the site. The first phase of the field work occurred in conjunction with the First Semi-Annual 2010 event (May 2010) and consisted of (1) a sewer line examination, (2) headspace methane monitoring in groundwater monitoring wells of concern, and (3) a geochemical evaluation of groundwater and leachate. The results and summary of the first phase activities were submitted within the August 2, 2010 Water Quality Assessment Report.

Results of the first phase indicated that (a) no apparent impacts were identified in the vicinity of the sewer line, (b) no significant concentrations of methane are currently present in the headspace of the groundwater monitoring wells of concern, and (c) the geochemical comparisons of groundwater to leachate indicate possible mixing of groundwater and leachate. However the lack of heavy metals and the presence of downward trending VOCs in groundwater indicated that landfill gas likely was the source of impact at some stage. The improving groundwater conditions indicate that the source has likely been mitigated by the upgrades to the GCCS over the last few years.

A February 28, 2011 Water Quality Assessment Report provided an updated summary of the data collected during the Water Quality Assessment activities in the Second Semi-Annual 2010 event (second phase). Installation and monitoring of wells downgradient of the wells of concern would allow the delineation of the horizontal and vertical extent of VOCs. The second phase of the field work occurred in October and November 2010 (in conjunction with the Second Semi-Annual 2010 event) and consisted of (4) installing new wells MW-18R, MW-18AR, MW-19R, and MW-19AR, and (5) sampling the new wells for the Appendix I list of constituents.

Results of the second phase indicated that (d) lack of impact at well MW-18AR, which defines the extent of horizontal and vertical area of impact in the MW-18A area, and (e) impacts below the 2L Standards have not been horizontally or vertically defined in the MW-19R/MW-19AR portion of the site.

Latest Water Quality Assessment Activities

The water quality assessment (extent) wells are sampled routinely and consist of wells MW-18R, MW-18AR, MW-19R, and MW-19AR. The First Semi-Annual 2014 event sampling results exhibited concentrations below the GWPSs, with the exception of benzene (MW-19AR and MW-19R). No GWPSs have been confirmed exceeded at MW-18R and MW-18AR since installation in 2010. Review of data for MW-19R and MW-19AR indicates that these same constituents were previously above GWPSs in adjacent/upgradient wells MW-19 and/or MW-19A. No GWPSs have been statistically exceeded at MW-19 or MW-19A since the Second Semi-Annual 2009 event. Concentrations for benzene have been decreasing to stable at MW-19, MW-19A, MW-19R, and MW-19AR likely due to the enhancements to the GCCS in combination with natural attenuations.

Conclusion

The groundwater impacts detected at the site appears to be attributable to landfill gas and not due to mixing of groundwater with leachate, as noted in previous submittals. In ten years of annual Appendix II assessment monitoring, only one Appendix II organic constituent (dichlorodifluoromethane) and two Appendix II inorganic constituents (mercury and tin) have been detected that are not also on Appendix I. Dichlorodifluoromethane, mercury, and tin are currently analyzed during each semi-annual event at each well and this will continue.

An alternative frequency for analysis of the full set of Appendix II constituents is allowable by the NCDENR Requirements for Municipal Solid Waste Landfill Facilities Section .1634(c) and has been approved for other BFI/Republic facilities in nearby states. In consideration of all of the factors mentioned above and ten years of available Appendix II data, the facility requests NCDENR approval to modify the frequency of the full set of Appendix II monitoring to every 3 years. The most recent full set of Appendix II sampling event occurred during the first semi-annual 2014 event (April 2014), therefore if approved, the next Appendix II event would occur during the first semi-annual 2017 event. The previously confirmed Appendix II detections (dichlorodifluoromethane, mercury, and tin) would continue to be sampled semi-annually at each well along with the Appendix I constituents.

Should you have any questions or concerns, please contact Mr. Mike Gurley at (704) 262-6019 or Steve Jett at (314) 496-4654.

Sincerely,



Steve Jett, LG #1825
Owner, Jett Environmental Consulting, PLLC (C-517)

Attachment: *Figure 1 – Potentiometric Surface Map*

cc: *Mike Gurley, Republic Services, Inc. (PDF Copy via Email)*

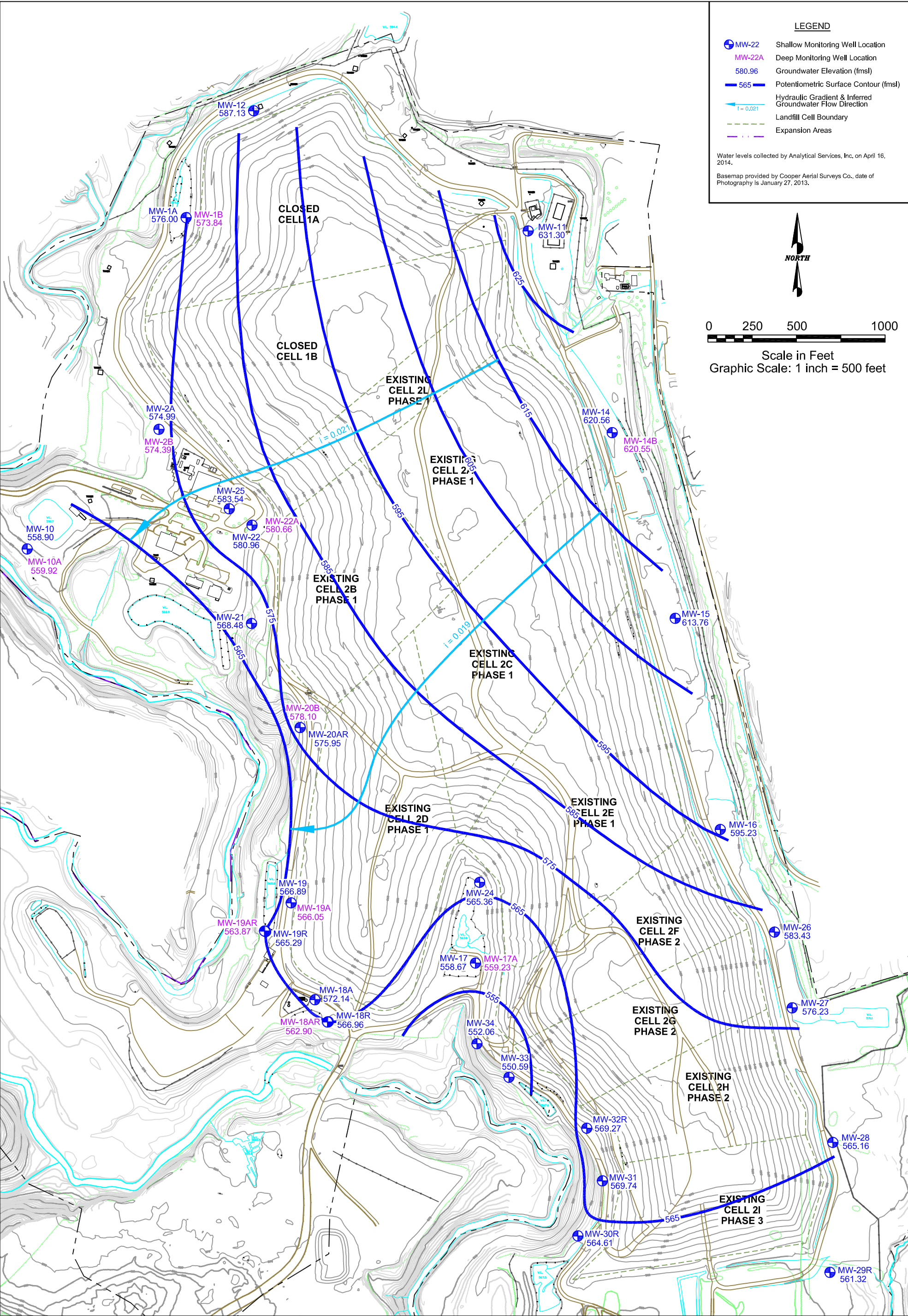


Figure 1
First Semi-Annual 2014 Potentiometric Surface Map
Charlotte Motor Speedway Landfill V, Harrisburg, North Carolina